Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

SHOUT
SHARE
IT

Copy 1

UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1342

Washington, D. C. ▼ July, 1925

EFFECT OF FEEDING GREEN RYE AND GREEN COWPEAS ON THE FLAVOR AND ODOR OF MILK

By C. J. Babcock, *Assistant Market Milk Specialist, Bureau of Dairying*

CONTENTS

	Page		Page
Experimental feeding of green rye	2	Experimental feeding of green cowpeas—Continued.	
Procedure	2	Procedure	5
Feeding 15 pounds one hour before milking	4	Feeding 15 pounds one hour before milking	6
Feeding 30 pounds one hour before milking	4	Feeding 30 pounds one hour before milking	7
Feeding 30 pounds immediately after milking	5	Feeding 30 pounds immediately after milking	7
Experimental feeding of green cowpeas	5	Conclusions	8

Although silage furnishes a satisfactory feed to supplement short summer pasture, there are cases where so few cows are kept that they can not consume the silage fast enough to prevent its spoiling, or silage may not be available. Under these conditions the wise dairyman will provide a well-planned succession of soiling crops to keep up the milk flow when pastures are scanty. Where the climate is favorable, rye and cowpeas are well adapted to fit into the succession of soiling crops.

Like other succulent feeds,[1] green rye and green cowpeas may have a tendency to impart undesirable flavors and odors to the milk. In order to determine whether such flavors and odors are imparted to the milk, feeding experiments were conducted by the Bureau of Dairying at its experiment farm at Beltsville, Md.[2] The specific objects of the investigation were (1) to determine whether feeding

[1] The effects of silage, green alfalfa, green corn, turnips, cabbage, potatoes, and garlic have been studied and reported in U. S. Department of Agriculture Bulletins No. 1097, "The Effect of Silage on the Flavor and Odor of Milk"; No. 1190, "The Effect of Feeding Green Alfalfa and Green Corn on the Flavor and Odor of Milk"; No. 1208, "Effect of Feeding Turnips on the Flavor and Odor of Milk"; No. 1297, "Effect of Feeding Cabbage and Potatoes on the Flavor and Odor of Milk"; and No. 1326, "Effect of Garlic on the Flavor and Odor of Milk."

[2] The writer acknowledges the assistance of T. E. Woodward, in charge of the Dairy Experiment Farm, Beltsville, Md., and James L. Gordon, herdsman, who supervised the experimental work at the farm.

43523°—25

green rye and green cowpeas affects the flavor and odor of milk and (2) to determine how these feeds may be fed and the milk handled so as to minimize such effect, if objectionable, on the quality of the product.

EXPERIMENTAL FEEDING OF GREEN RYE

PROCEDURE

The investigation was conducted with 10 Holstein and 10 Jersey cows. The ones selected were giving milk relatively free from abnormal flavors and odors, when fed a basic hay and grain ration. They were representative of their respective breeds, the average weight of the Jersey cows being 976 pounds and that of the Holstein cows 1,271 pounds.

The stage of lactation varied from fresh cows to those nearing the end of their lactation period. The average daily milk production of the Jersey cows was 23.3 pounds, the highest individual daily average being 41.2 pounds, the lowest 10.1 pounds. The Holstein cows gave an average daily milk production of 37.7 pounds, the highest individual daily average being 57.3 pounds, the lowest 20.2 pounds. The average daily milk production of all the cows was 30.5 pounds.

The green rye was cut and fed before it had headed out. The cutting started when it was about 15 inches high. In addition to green rye, the cows received, in proportion to the amount of milk produced, varying quantities of the following grain mixture: Hominy feed, bran, and oats, 100 pounds each; cottonseed meal and linseed meal, 50 pounds each. The average quantity of grain fed daily was 8.3 pounds.

The ration was then completed by feeding the cows what alfalfa hay they would readily consume. This varied considerably, ranging from 6.8 pounds to 18.6 pounds, depending upon the quantity of green rye the cows were receiving. The average daily quantity of alfalfa hay received was 12.3 pounds.

The cows were divided into groups of five each. One group received only the basic hay and grain ration, and were known as checks. The other three groups received, respectively, in addition to the hay and grain ration, the following quantities of green rye:

15 pounds one hour before milking.
30 pounds one hour before milking.
30 pounds immediately after milking.

The cows were fed these rations for four consecutive days, then for one day no green rye was fed, after which the cows in the various groups were interchanged in order to equalize any abnormal results due to the milk of an individual animal. The feeding of green rye was then resumed.

Samples were taken from the milk of each cow at the time of milking, given a key number, and cooled but not aerated. The samples were judged for flavor and odor by experienced judges, who had no knowledge of the key. An "opinion," as this term is used in the following pages, denotes the decision of a judge in regard to one sample.

In judging the samples, all flavors and odors which the judges believed to be due to feed were designated as "abnormal" and the varying degrees in which they were found to be abnormal were classified as "very slightly off," "slightly off," and "off."

The majority of consumers might have no serious objection to those samples rated as "slightly off," and it is doubtful whether the flavors and odors rated as "very slightly off" would be noticed by persons other than those accustomed to judging milk and cream.

When no feed flavor or odor was perceptible the sample was rated as "normal." The normal samples were subdivided into two classes—O. K., and flat or watery. These classes are not shown in the following tables, as there was practically no difference in the percentage of opinions rating the samples flat or watery in the various groups, including the check samples.

The check samples were taken from the milk produced by cows receiving only the basic hay and grain ration. There were very few of these in which slight abnormal flavors and odors were perceptible. A total of 296 opinions on 59 samples showed 98 per cent rating the milk normal in flavor and 97.6 per cent normal in odor. All of the abnormal flavors and odors, i. e., 2 per cent and 2.4 per cent of the opinions on flavor and odor, respectively, were rated as very slightly off. (See Table 1 and fig. 1.)

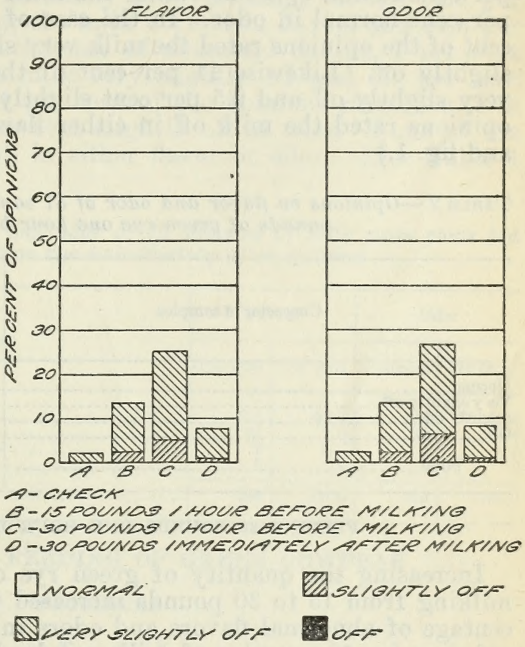

FIG. 1.—Effect of feeding green rye on the flavor and odor of milk

TABLE 1.—*Opinions on flavor and odor of 59 samples of milk from cows fed basic rations of hay and grain (check cows)*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	290	98.0	289	97.6
Very slightly off	6	2.0	7	2.4
Slightly off	0	0	0	0
Off	0	0	0	0
Total	296	100.0	296	100.0

FEEDING 15 POUNDS ONE HOUR BEFORE MILKING

When the cows consumed 15 pounds of green rye one hour before milking there was but a slight effect on either the flavor or odor of the milk produced. A total of 282 opinions on 57 samples of milk produced by cows consuming this quantity of green rye showed 86.9 per cent of the opinions rating the milk normal in flavor and 86.5 per cent normal in odor. In the case of abnormal flavors 10.6 per cent of the opinions rated the milk very slightly off and 2.5 per cent slightly off. Likewise 11 per cent of the opinions rated the milk very slightly off and 2.5 per cent slightly off in odor. None of the opinions rated the milk off in either flavor or odor. (See Table 2 and fig. 1.)

TABLE 2.—*Opinions on flavor and odor of 57 samples of milk from cows fed 15 pounds of green rye one hour before milking*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	245	86.9	244	86.5
Very slightly off	30	10.6	31	11.0
Slightly off	7	2.5	7	2.5
Off	0	0	0	0
Total	282	100.0	282	100.0

FEEDING 30 POUNDS ONE HOUR BEFORE MILKING

Increasing the quantity of green rye consumed one hour before milking from 15 to 30 pounds increased to a slight extent the percentage of abnormal flavors and odors in the milk. A total of 300 opinions on 60 samples of milk, produced by cows consuming the larger quantity of green rye, showed 75 per cent of the opinions rating the milk normal in flavor and 73.3 per cent normal in odor. In the case of abnormal flavors 20 per cent rated the milk very slightly off and 5 per cent slightly off. Likewise, 20 per cent of the opinions rated the milk very slightly off and 6.7 per cent slightly off in odor. None of the opinions rated the milk off in either flavor or odor. (See Table 3 and fig. 1.)

TABLE 3.—*Opinions on flavor and odor of 60 samples of milk from cows fed 30 pounds of green rye 1 hour before milking*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	225	75.0	220	73.3
Very slightly off	60	20.0	60	20.0
Slightly off	15	5.0	20	6.7
Off	0	0	0	0
Total	300	100.0	300	100.0

FEEDING 30 POUNDS IMMEDIATELY AFTER MILKING

There was but little effect on either the flavor or odor of the milk produced at the next milking when cows consumed 30 pounds of green rye immediately after the previous milking. A total of 299 opinions on 60 samples of milk, produced by cows consuming this quantity of green rye immediately after milking, showed 92.3 per cent of the opinions rating the milk normal in flavor, and 91.6 per cent normal in odor. In the case of abnormal flavors, 7 per cent of the opinions rated the milk very slightly off and 0.7 per cent slightly off. Likewise, 7.4 per cent of the opinions rated the milk very slightly off and 1 per cent slightly off in odor. None of the opinions rated the milk off in either flavor or odor. (See Table 4 and fig. 1.)

TABLE 4.—*Opinions on flavor and odor of 60 samples of milk from cows fed 30 pounds of green rye immediately after milking*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	276	92.3	274	91.6
Very slightly off	21	7.0	22	7.4
Slightly off	2	0.7	3	1.0
Off	0	0	0	0
Total	299	100.0	299	100.0

EXPERIMENTAL FEEDING OF GREEN COWPEAS

PROCEDURE

In order to determine what effect feeding green cowpeas has on the flavor and odor of milk, feeding experiments similar to those with green rye were conducted. The samples were handled and judged in the same manner as those taken when green rye was fed.

The investigation was conducted with 7 Holstein and 13 Jersey cows. The average weight of the Holstein cows was 1,169 pounds, and of the Jerseys 923 pounds. The average daily milk production of the Holstein cows was 22.5 pounds, the highest individual average being 31.7 pounds and the lowest 9.4 pounds. The Jersey cows gave an average daily milk production of 16.3 pounds, the highest individual average being 25.3 pounds and the lowest 8.5 pounds. The average daily milk production of all the cows was 18.4 pounds.

The cowpeas were fed soon after blooming and before the seed had formed. In addition to green cowpeas, the cows were fed varying quantities of the same grain mixture as was given during the green-rye experiments, and the ration was completed by feeding what alfalfa hay the cows would readily consume. The average quantity of grain fed daily was 8.3 pounds. The largest quantity received by any cow was 15 pounds, the smallest 3 pounds. The quantity of alfalfa hay fed daily varied from 8 to 18.8 pounds, depending upon the quantity of green cowpeas the cows were receiving. The average daily quantity of alfalfa hay consumed was 12.6 pounds.

The check samples were taken from the milk of the check cows, which were fed only the basic hay and grain ration. Some abnormal flavors and odors were noted in these samples, but they were mostly very slight, and undoubtedly were instances of the abnormal flavors and odors frequently encountered in milk from individual cows. A total of 251 opinions on 71 samples showed 92.4 per cent rating the milk normal in both flavor and odor. The greater percentage of the abnormal flavors and odors—7.2 per cent—were rated as very slightly off, while one opinion or 0.4 per cent rated a sample as slightly off. There were no opinions rating a sample off in either flavor or odor. (See Table 5 and fig. 2.)

TABLE 5.—*Opinions on flavor and odor of 71 samples of milk from cows fed basic rations of hay and grain (check cows)*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	232	92.4	232	92.4
Very slightly off	18	7.2	18	7.2
Slightly off	1	0.4	1	0.4
Off	0	0	0	.0
Total	251	100.0	251	100.0

FEEDING 15 POUNDS ONE HOUR BEFORE MILKING

When the cows consumed an average of 14.7 pounds (out of 15 pounds fed) of green cowpeas one hour before milking, there was a slight effect on both the flavor and the odor of the milk produced. A total of 237 opinions on 67 samples of milk produced by cows consuming this quantity of green cowpeas showed 75.5 per cent of the opinions rating the milk normal in both flavor and odor. In the case of abnormal flavors, 20.3 per cent of the opinions rated the milk very slightly off and 4.2 per cent slightly off. Likewise 19.8 per cent of the opinions rated the milk very slightly off and 4.7 per cent slightly off in odor. None of the opinions rated the milk off in either flavor or odor. (See Table 6 and Fig. 2.)

TABLE 6.—*Opinions on flavor and odor of 67 samples of milk from cows fed 15 pounds (average consumed 14.7 pounds) of cowpeas one hour before milking*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	179	75.5	179	75.5
Very slightly off	48	20.3	47	19.8
Slightly off	10	4.2	11	4.7
Off	0	0	0	0
Total	237	100.0	237	100.0

FEEDING 30 POUNDS ONE HOUR BEFORE MILKING

When the quantity of green cowpeas consumed was increased from an average of 14.7 pounds (out of 15 pounds fed) to an average of 29.2 pounds (out of 30 pounds fed) there was an increase in the percentage of abnormal flavors and odors in the milk. A total of 195 opinions on 55 samples produced by cows consuming the larger quantity of green cowpeas showed 69.2 per cent of the opinions rating the milk normal in flavor and 68.7 per cent normal in odor. In the case of abnormal flavors and odors, 24.1 per cent rated the milk very slightly off in flavor and 24.6 per cent rated it very slightly off in odor. Likewise 5.1 and 1.6 per cent of the opinions rated the milk slightly off and off respectively in both flavor and odor. (See Table 7 and fig. 2.)

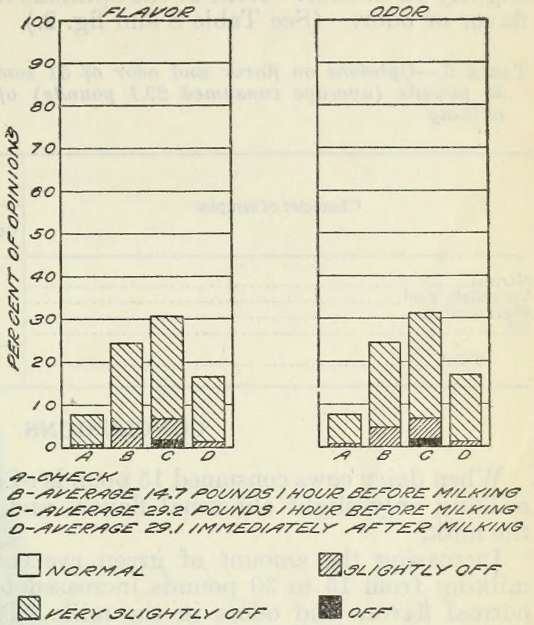

FIG. 2.—Effect of feeding green cowpeas on the flavor and odor of milk

TABLE 7.—*Opinions on flavor and odor of 55 samples of milk from cows fed 30 pounds (average consumed 29.2 pounds) of cowpeas one hour before milking*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	135	69.2	134	68.7
Very slightly off	47	24.1	48	24.6
Slightly off	10	5.1	10	5.1
Off	3	1.6	3	1.6
Total	195	100.0	195	100.0

FEEDING 30 POUNDS IMMEDIATELY AFTER MILKING

There was but slight effect on either the flavor or the odor of the milk produced at the next milking when the cows consumed an average of 29.1 pounds (out of 30 pounds fed) immediately after the previous milking. A total of 183 opinions on 51 samples of milk produced by cows consuming this quantity of green cowpeas immediately after milking showed 83.6 per cent of the opinions rating the milk normal in flavor, and 83.1 per cent normal in odor. In the

case of abnormal flavors, 15.3 per cent of the opinions rated the milk very slightly off and 1.1 per cent slightly off. Likewise 15.8 per cent of the opinions rated the milk very slightly off, and 1.1 per cent slightly off in odor. None of the opinions rated the milk off in either flavor or odor. (See Table 8 and fig. 2.)

TABLE 8.—*Opinions on flavor and odor of 51 samples of milk from cows fed 30 pounds (average consumed 29.1 pounds) of cowpeas immediately after milking*

Character of samples	Flavor		Odor	
	Opinions	Per cent	Opinions	Per cent
Normal	153	83.6	152	83.1
Very slightly off	28	15.3	29	15.8
Slightly off	2	1.1	2	1.1
Off	0	0	0	0
Total	183	100.0	183	100.0

CONCLUSIONS

When dairy cows consumed 15 pounds of green rye one hour before milking only slight abnormal flavors and odors were produced in the milk.

Increasing the amount of green rye consumed one hour before milking from 15 to 30 pounds increased to a slight extent the abnormal flavors and odors in the milk. They were, however, only slight and would likely not be objectionable to the majority of consumers.

Feeding 30 pounds of green rye immediately after the previous milking had practically no effect on either the flavor or the odor of the milk produced at the next milking.

When dairy cows consumed an average of 14.7 pounds (out of 15 pounds fed) of green cowpeas one hour before milking, only slight abnormal flavors and odors were produced in the milk.

Increasing the amount of green cowpeas consumed one hour before milking from an average of 14.7 pounds (out of 15 pounds fed) to an average of 29.2 pounds (out of 30 pounds fed) increased to some extent the abnormal flavors and odors in the milk.

When the cows consumed an average of 29.1 pounds (out of 30 pounds fed) immediately after the previous milking, there was but very little effect on either the flavor or odor of the milk produced at the next milking.

The abnormal flavors and odors produced by feeding green cowpeas were more pronounced than those produced by feeding green rye.

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
5 CENTS PER COPY

▽